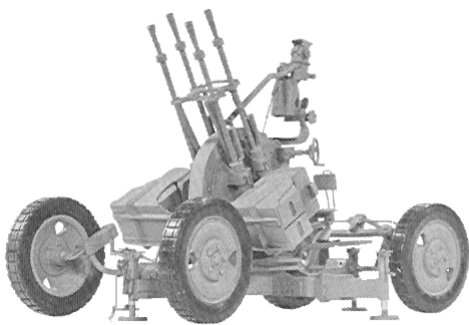


Tire Size is 6.50 x 20. The gun can be employed on an SP tracked vehicle mount. A Chinese built direct copy of the Soviet twin barrel export version of the M-1939. The Type 65 consists of two recoil operated automatic cannons mounted on a towed, four-wheeled carriage. All tracking and loading operations are performed manually by a five to eight man gun crew. Because it lacks a radar and powered gun laying motors, the Type 65 is considered to be effective only during daylight and in fair weather.

Strengths: Highly reliable, rugged and simple to operate.

7-4.1

Russian 14.5-mm Heavy Machinegun ZPU-4

		Weapons & Ammunition Types 4 barreled KPV 14.5-mm heavy machinegun AP-T API API-T HEI HEI-T	Typical Combat Load 4,800 rds (1,200 rds/barrel)
SYSTEM Alternative Designations: None Date of Introduction: 1949 Proliferation: At least 45 countries Description: Crew: 5 Carriage: 4 wheeled/2 axle towed chassis Combat Weight (kg): 1,810 Length Overall (m): Travel Position: 4.53 Firing Position: 4.53 Length of Barrel (m): 1.348 Height (m): Overall: INA Travel Position: 2.13 Firing Position: INA Width Overall (m): 1.72 Prime Mover: INA Automotive Performance: Max. Towed Speed (km/h): 35 Emplacement Time (min): 2 Displacement Time (min): 2	ARMAMENT Gun: Caliber, Type: 14.5 mm machinegun Number of Barrels: 4 Service Life of Barrel (rds): INA Rate of Fire(rd/min): Max: 2,200-2,400 (600/barrel) Practical: 600 (150/barrel) Loader Type: Belt of 150 rds Reload Time (sec): 15 Traverse (°): 360 Traverse Rate (°/sec): 48 Elevation (°): -8 to +90 Elevation Rate (°/sec): 29 Reaction time (sec): 8 FIRE CONTROL Optical mechanical computing sight Telescope, ground targets	VARIANTS Type 56: Chinese and NK variant. MR-4: Romanian single axle variant MAIN ARMAMENT AMMUNITION Types: API, API-T, HEI, AP-T, HEI-T Range (m): Max: 8,000 Min: INA Altitude (m): Max: 5,000 Effective: 1,400	

NOTES


The ZPU-4 can be fired with wheels in travel position if necessary.

The ZPU-4 may also be employed in a ground support role.

Strengths: Highly reliable, rugged and simple to operate. Quick reaction time, widely deployed, explosive round.

Weaknesses: The short-range small projectile requires a direct hit. No organic radar (except the NK Type 56 and M1983).

Russian 57-mm Self Propelled SP AA Gun ZSU-57-2

	Weapons & Ammunition Types Twin 57-mm automatic cannons Frag-HE AP-T APC-T	Typical Combat Load 300
SYSTEM Alternative Designations: None Date of Introduction: 1955 Proliferation: At least 16 countries Description: Crew: 6 Carriage: 4 road wheels/T-54 modified chassis Combat Weight (mt): 28.0 Length Overall (m): 8.4 Length of Barrel (m): INA Height Overall (m): 2.75 Width Overall (m): 3.270 Prime Mover: A shortened T-54 chassis with thinner armor and only four road wheels. Automotive Performance: Emplacement Time (min): N/A Displacement Time (min): N/A Engine Power (hp): 520 Max Road Speed (km/h): 50 Cruising Range (km): 400 Fording Depth (m): 1.4 Armor Protection: 13 mm front hull and turret	ARMAMENT Gun, Caliber, Type: 57-mm recoil-operated air-cooled cannons, S-68 Number of Barrels: 2 Service Life of Barrel (rds): INA Rate of Fire (rd/min): Cyclic: 210-240 (105-120/gun) Practical: 140 (70/gun) Loader Type: 5-round clip, manual Reload Time (min): INA Traverse (°): 360 Traverse Rate (°/sec): 30 Elevation (°): -5 to +85 Elevation Rate (°/sec): 20 FIRE CONTROL Sights w/magnification: Optical mechanical computing reflex sight (not radar controlled) Later variants were fitted with a more sophisticated sighting system, identified by two small ports in forward upper portion of the turret.	VARIANTS Type 80 Chinese variant MAIN ARMAMENT AMMUNITION Types: APHE, Frag-T, APC-T, HVAP-T, HE-T Range (m): Max Range: 12,000 Tactical AA range: 3,993 Altitude: Max Altitude: 8,000 Effective (m): 2,835 at 45° 4,237 at 65° Projectile Weight (kg): Frag-T: 2.81 APC-T: 2.82 HE-T: 2.85 Muzzle Velocity (m/s): 1,000 Fuze Type: Frag-T (point detonating fuze) APC-T (base detonating fuze) HE-T (Yugoslavian, impact [super quick] action with pyrotechnical self-destruct) Self-Destruct time (sec): 13-17 Armor penetration (mm): 96 APC-T at 1,000 m

NOTES

The ZSU-57-2 can be employed in a ground support role.

No NBC system and no amphibious capability.

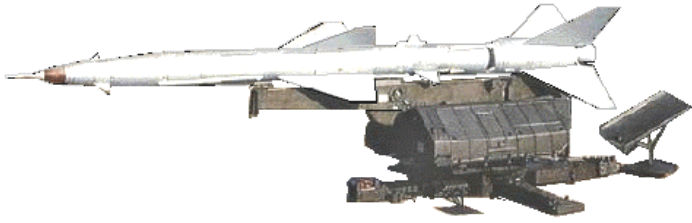
Fuel drums can be fitted on rear of hull.

Absence of a tracking radar, a night vision device, and an enclosed turret makes this a daylight, fair weather weapon system only.

Auto traverse with manual backup.

Uses same ammo as the towed single S-60.

Russian SAM System SA-2/GUIDELINE

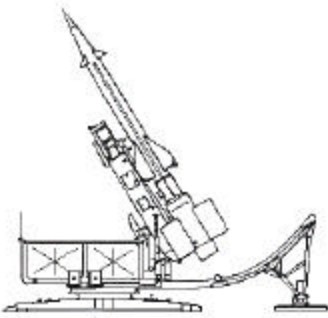
	<p>Weapons & Ammunition Types</p> <p>Single rail ground mounted</p>	<p>Typical Combat Load</p> <p>Six launchers per battery</p>
<p>SYSTEM Alternative Designations: V75SM, S-75 Dvina, V-75 Volkhov Date of Introduction: 1959 Proliferation: At least 41 countries</p> <p>ARMAMENT Launcher Description: Single-rail, ground- mounted, not mobile but transportable Name: INA Dimensions: INA Weight (kg): INA Reaction Time (sec): INA Time Between Launches (sec): INA Reload Time (min): 10-12 Fire on Move: No Emplacement Time (min): 1 to 5 days Displacement Time (min): < 2 days Normal Salvo: 3 missiles at six-second intervals</p> <p>Missile: V750K Name: INA Range (km): Max. Range: 35-50 Volga 55, Volga-M 67 Min. Range: 7-9 Altitude (m): Max. Altitude: 28,000 Volga, Volga-M 30,000 Min. Altitude: 100 Dimensions: Length (m): 10.70 Diameter (m): 0.70</p>	<p>Weight (kg): 2,300-2,450 at launch Missile Speed (mach): 4.5 Propulsion: Solid fuel booster 5 sec duration Sustainer liquid 22 sec duration Guidance: Command RF Warhead Types: HE, Nuc Bursting Radius (m): 125-135 Kill Radius (m): 65 CEP (m): 76.3 Fuze Type: Proximity or Command Command destruction at (sec): 115 Warhead Weight (kg): 195 HE</p> <p>FIRE CONTROL Radar: Name: FAN SONG, A-F variants Function: Fire Control Control Range (km): 60-120 A, B 70-145 for C, D, E INA for F Frequency Band: E/F for A, B G for C, D, E, INA for F Location: Within battery formation</p> <p>Radar: Name: SPOON REST, P-12 Function: Target Acquisition, Early Warning Detection Range (km): 275 Frequency Band: A=A (VHF) B=VHF below A band Location: Outside battery formation</p>	<p>Radar: Name: FLAT FACE, P-15 Function: Early warning, target acquisition Detection Range (km): 250 Frequency Band: C Location: At regimental HQ</p> <p>Radar: Name: SIDE NET, PRV-11 Function: Height Finding Radar Detection Range (km): 180 Frequency Band: E Location: At regimental HQs in some cases</p> <p>VARIANTS SA-2a (Mod 0): FAN SONG A SA-2b (Mod 1): FAN SONG B, longer missile SA-2c (Mod 2): FAN SONG C, longer range, lower altitude engagement SA-2d (Mod 3): FAN SONG E, EW enhanced SA-2e (Mod 4): FAN SONG E nuc variant SA-2f (Mod 5): FAN SONG F, EW enhanced Backup optical, home-in on jam-capable missile SA-N-2: Naval test version, unsuccessful HQ-2: Chinese variant (CSA-1) Volga-M upgrade: Mid 90's, digital sub- systems, 41 miles range, less maintenance Iraqi Mod: Infrared terminal guidance/missile</p>

NOTES

The SA-2/Guideline is a two-stage medium-to-high altitude, long-range, radar-tracking SAM. The weapon is a national-level asset usually found in the rear area with the mission of defending static assets such as supply and command installations. It is fired from a single-rail ground-mounted launcher that can be moved by a truck. The missiles are carried on a special transloader-semi-trailer towed by a Zil truck. An SA-2 regiment consists of three battalions, each having a single firing battery. Each battery has six launchers arranged in a star formation, a centrally located FAN SONG fire control radar, and a loading vehicle. The two forward batteries usually locate 40 to 50 km behind front lines; the third battery locates approx 80 km behind.

Limitations include limited effectiveness against updated ECM, restricted mobility, and limited effectiveness against low-altitude targets.

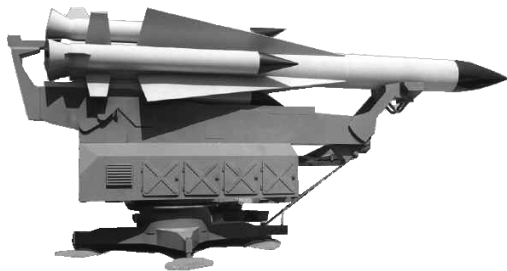
Russian SAM System SA-3/GOA

	<p>Weapons & Ammunition Types</p> <p>Launch rails</p>	<p>Typical Combat Load</p> <p>2 or 4</p>
<p>SYSTEM Alternative Designations: S-125 Neva, S-125 Pechora (export) Date of Introduction: Twin launcher 1961/quadraple launcher 1973. Proliferation: At least 39 countries</p> <p>LAUNCHER Description: Towed twin or quad-rail launcher Name: INA Dimensions: INA Weight (kg): INA Reaction Time (sec): INA Time Between Launches (sec): INA Reload Time (min): 50 (quad launcher) Fire on Move: No Emplacement Time (min): 120 Displacement Time (min): 100</p>	<p>ARMAMENT Missile: Name: Volga (5V24, 5V27) Range (m): Max. Range: 29,000 Min. Range: 6,000 Altitude (m): Max. Altitude: 25,000 Min. Altitude: 100 Dimensions: Length (m): 6.10 Diameter (mm): 550 Weight (kg): 946 Missile Speed (m/s): 650-1,150 Velocity (mach): 3.5 Propulsion: Solid fuel booster Guidance: Command RF Warhead Type: Frag-HE Fuze Type: Proximity RF Warhead Weight (kg): 73</p>	<p>FIRE CONTROL Radar: Name: LOW BLOW Function: Missile Control Control Range (km): 85 Detection Range (km): 110 Frequency Band: I Tracking Capability: 6 a/c simultaneously</p> <p>Radar: Name: FLAT FACE/P-15 Function: Target Acquisition Detection Range (km): 250 Frequency Band: C</p> <p>Radar: Name: SQUAT EYE/P-15M Function: Target Acquisition (low altitude, instead of FLAT FACE) Detection Range (km): INA Frequency Band: C</p> <p>VARIANTS SA-3a: Two-rail launcher. Missiles without interstage fins. SA-3b (GOA Mod 1): Two-rail launcher. Missiles have interstage fins. SA-3c: Four-rail launcher. S-125 Pechora: Export version SA-N-1: Naval version</p>

NOTES

The SA-3/GOA is a two-stage, low- to medium-altitude SAM. Two ready missiles travel in tandem on a modified truck or tracked vehicle from which the crew loads the missiles onto a ground-mounted, trainable launcher for firing. The truck-mounted FLAT FACE radar acquires the targets, while the LOW BLOW radar carries out the fire control function. It is principally a point/small area defense weapon. The SA-3 system is not mobile. It is movable, but its displacement time is considerable.

Russian SAM System SA-5/GAMMON

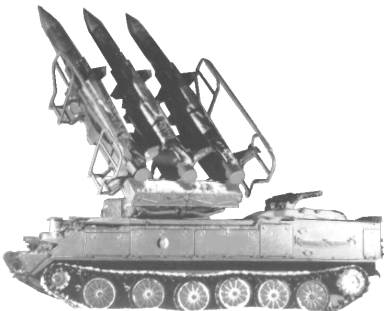
		Weapons & Ammunition Types Single-rail ground mounted	Typical Combat Load Six launchers per Battalion
SYSTEM Alternative Designations: S-200, Volga Date of Introduction: 1963 Proliferation: At least 15 countries ARMAMENT Launcher: Description: Single-rail, ground- mounted, not mobile but transportable Dimensions: INA Weight (kg): INA Reaction Time (sec): INA Time Between Launches (sec): INA Reload Time (min): INA Fire on Move: No Emplacement Time (min): Days Displacement Time (min): Days Missile: (See NOTES) Name: INA Range (km): Max. Slant Range: 300 Effective Range: 250 Min. Range: 60-80 Altitude (m): Max. Altitude: 29,000 Effective ceiling: 30,000 Min. Altitude: INA Dimensions: Length (m): 10.7 Diameter (mm): 860 Weight (kg): 7,100 Wrap around Boosters: Length (m): 4.9 Diameter (mm): 500 Missile Speed (m/s): 1,100 Propulsion: 2-stage solid fuel, four wrap-around solid fuel rockets	Guidance: Semi-active homing Warhead Type: Conventional (HE) or nuclear Fuze Type: INA Warhead Weight (kg): 60 HE Self-Destruct (sec): INA Booster separation at (km): 60 Reload Time (min): 5 FIRE CONTROL Radar: Name: SQUARE PAIR Function: Tracking/command guidance Effective Range (km): 160 Frequency (GHz): 6.62-6.94 Frequency Band: H Located: With firing units Associated Radars: Name: BACK NET initially BAR LOCK B (P-50) follow-on Function: Surveillance/ early warning Range (km): 250/ 390 Frequency Band: E-band (2-2.5 GHz) / E & F bands Location: Generally with separate early warning or Signals Reconnaissance bns Name: SIDE NET/PRV-11 initially, ODD PAIR, E-band follow-on Function: Height Finding Radar Range: INA Frequency Band: E-band Location: Generally with separate early warning or Signals Reconnaissance bns	Name: TALL KING Function: Very long-range early warning Effective Range (km): 500-600 Frequency Band: A-band (150-180 MHz) Location: Generally with separate early warning or Signals Reconnaissance bns Name: BACK TRAP Function: Very long-range early warning Effective Range (km): INA Frequency Band: A-band (172 MHz) Location: Brigade Level Name: BIG BACK Function: Very long-range early warning Effective Range (km): INA Frequency Band: 3-d L-band Location: Brigade Level VARIANTS Possibly as many as 5 missiles/variants SA-5a: Original missile SA-5b: Nuclear warhead mod, circa 1970 SA-5c: Independently powered, active homing conventional or nuc warhead circa 1975 SA-5d: Israelis suggest this version has a steerable warhead SA-5e: Possibly a passive anti-radiation seeker	

NOTES

The SA-5/Gammon is a long-range, medium-to-high altitude strategic semi-active guided missile system. It may have a very limited antimissile capability. Designed as replacement to the SA-2, it was developed for targeting medium-to-high altitude, high-speed aircraft. It is believed to be of little use against low-altitude and tactical aircraft.

The missile has a long cylindrical body with a conical nose, four long chord cruciform delta wings, four small cruciform rectangular control surfaces at the extreme rear, and four jettisonable, wraparound solid-fuel boosters with canted nozzles. It uses a solid propellant, dual thrust rocket engine, and the missile travels about 60 km before booster separation, during which time the missile is not under control. After booster separation, initially the missile uses radio commands from the SQUARE PAIR radar and then active radar terminal homing guidance. Course correction is transmitted by the SQUARE PAIR after booster separation. The terminal radar seeker is activated for the final approach near intercept. The sustainer has four cropped delta wings and steerable rear fins. Control is assisted by ailerons.

Russian SAM System SA-6/GAINFUL

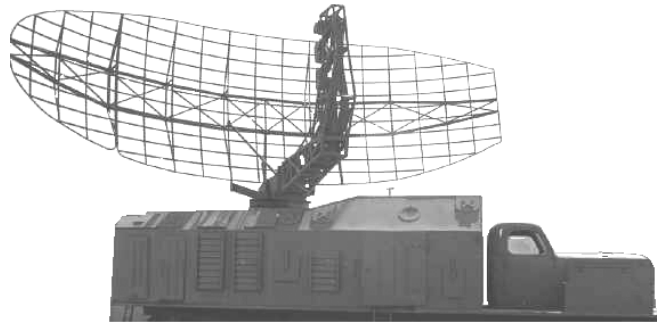
		Weapons & Ammunition Types Launch rails	Typical Combat Load 3
SYSTEM Alternative Designations: Kub, Kvadral Date of Introduction: 1966 Proliferation: At least 22 countries Description: Crew: 3 Combat Weight (mt): 14 TEL Chassis: Modified PT-76 Length (m): 6.09 Height (m): 4.45 Width (m): 3.04 Automotive Performance: Engine Name, Type: V-6R, 6 cyl diesel Cruising Range (km): 250 Speed (km/h): Max. Road: 45 Max. Swim: N/A Radio: INA Protection: NBC Protection System: Yes	ARMAMENT Launcher: Name: 2P25 Reaction Time (min): INA Time Between Launches (sec): INA Reload Time (min): 10 Fire on Move: No Emplacement Time (min): 5 or less Displacement Time (min): INA Missile: Name: 3M9, 9M9 Range (m): Max. Range: 25,000 Min. Range: 4,000 Altitude (m): Max. Altitude: 15,000 Min. Altitude: 50 Dimensions: Length (m): 6.20 Diameter (mm): 335 Weight (kg): 599 Missile Speed: Mach 2.7 Propulsion: Solid fuel Guidance: Semi-active radar homing Warhead Type: Frag HE Fuze Type: Proximity RF Warhead Weight (kg): 50	FIRE CONTROL Sights w/Magnification: EO sighting system on vehicle. Commander and driver have IR. IFF: Pulse-doppler Radar: Name: STRAIGHT FLUSH Function: Fire control /target acquisition Detection Range (km): 60-90 Tracking Range (km): 28 Frequency: I-low altitude (tracking); G/H-med altitude (acquisition); H (detection) Radar: Name: LONG TRACK Function: Battlefield surveillance/target acquisition Detection Range (km): 167 Tracking Range (km): 150 Frequency: 2.6 GHz Frequency Band: E Radar: Name: THIN SKIN Function: Height Finding Detection Range (km): 240 Tracking Range (km): INA Frequency Band: H VARIANTS SA-6b/GAINFUL: Mounted on MT-LB, has integrated radar. The TELAR can operate independently for surveillance.	

NOTES

The SA-6 is a two-stage, solid-fuel, low-altitude SAM. It has radio-command guidance with semi-active radar terminal homing. Targets are low to medium altitude fixed- and rotary-wing aircraft. Two or more missiles may be launched at a target during an engagement. The associated STRAIGHT FLUSH fire control/target acquisition radar vehicle uses the same chassis as the SA-6a TEL. The LONG TRACK target acquisition radar is also associated with the SA-6 system. The LONG TRACK surveillance radar acquires target data, the STRAIGHT FLUSH missile site radars take over target acquisition and fire control.

SA-6 regiments organic to mechanized and tank divisions consist of 20 TELs in five batteries, 4 TELs to a battery. The SA-6b system includes the FIRE DOME fire control radar. When the SA-6a TEL battery is replaced with an SA-6b TELAR, the battery doubles its capability to acquire and engage targets. Each battery has four triple launchers, one STRAIGHT FLUSH vehicle, and two reload vehicles (3 missiles each). Normally, three of these batteries are deployed approximately 5 km behind the front line; the remaining two are deployed about 10 km farther back, filling the gaps between the three forward batteries.

Russian SAM Radar System LONG TRACK



SYSTEM

Alternative Designations: INA

Date of Introduction: IOC 1967

Description: Twenty-five foot high single conventional parabolic mesh reflector antenna with multiple stacked feeds that is vehicle mounted.

Functions: Early warning radar, surveillance and target acquisition

Chassis: A modified version of the AT-T heavy tracked transporter or truck mounted.

Mobility: On/off road capable mobility is very good. The LONG TRACK was the first highly mobile early warning radar. The antenna is folded for transport.

ADA Unit Level: Employed at both battalion and brigade levels

Frequency Band: E- band, 2.6 GHz

Sweep Rate (rpm): 15

Effective Range (km): >150

Effective Altitude (km): 30

Track Targets on Move: No

Emplacement Time (min): INA

Displacement Time (min): INA

Associated SAMs: SA-4/GANEF, SA-6/GAINFUL, SA-8/GECKO

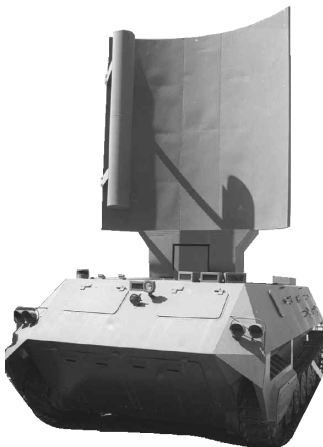
VARIANTS

Polish **Jawor** (circa 1965) and Polish **Farm Gate** (Truck mounted).

Exports: Restricted outside of former Warsaw Pact.

NOTES None

Russian SAM Radar System TUBE ARM



SYSTEM

Alternative Designation: INA

Date of Introduction: Circa 1983

Description: Eighteen foot high cut parabolic cylindrical antenna that is track vehicle mounted.

Functions: Acquisition and surveillance

Chassis: MT-LBu tracked vehicle

Mobility: On/off road capable mobility is very good.

Associated SAMs: SA-11 GADFLY

ADA Unit Level: Employed at both battalion and brigade levels

Frequency Band: H/I bands

Sweep Rate: INA

Effective Range (km): INA

Effective Altitude (km): INA

Track Targets on Move: INA

Emplacement Time (min): INA

Displacement Time (min): INA

VARIANTS

None known

Exports: None known due to problems with entire SA-11 system.

Follow-on/Replacement systems: 9S18M1 "SNOWDRIFT"

NOTES

This radar was originally developed for the SA-11/GADFLY. As a result of problems with the TUBE ARM surveillance radar, the 9S18M1 SNOWDRIFT radar was developed to replace it.